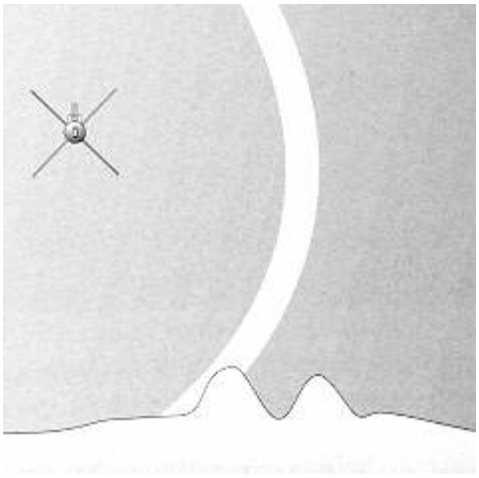
Appendix E

SIDESCAN SONAR SURVEY RESULTS AT THE CANDIDATE ODMDS FOR PORT EVERGLADES AND PALM BEACH, FLORIDA

SIDESCAN SONAR SURVEY RESULTS AT THE CANDIDATE OCEAN DREDGED MATERIAL DISPOSAL SITES FOR PORT EVERGLADES AND PALM BEACH, FLORIDA



Prepared for:

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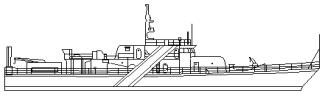

By:

U.S. Environmental Protection Agency
Region 4
Wetlands, Coastal and NonPoint Source Branch

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SIDESCAN SONAR SURVEY RESULTS AT THE CANDIDATE OCEAN DREDGED MATERIAL DISPOSAL SITES FOR PORT EVERGLADES AND PALM BEACH, FLORIDA

1.0 INTRODUCTION

The U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers have the responsibility under Section 102 of the Marine Protection, Research and Sanctuaries Act (MPRSA), for the management and monitoring of Ocean Dredged Material Disposal Sites (ODMDSs). EPA has the responsibility under the MPRSA for designation of sites for dredged material disposal. The Corps of Engineers Jacksonville District has requested that EPA Region 4 designate disposal sites off shore Palm Beach, Florida and Port Everglades, Florida for the disposal of dredged material.

To date, EPA and the COE have identified four candidate sites for Palm Beach and three for Port Everglades. In accordance with 40 CFR §228.4 of the Ocean Dumping regulations site designations will be made based on environmental studies of each site. Various surveys have been conducted in the past in the vicinity of these candidate site. These surveys along with this effort and a literature search will be used to characterize the candidate sites and adjacent regions to support dredged material disposal site designations offshore Port Everglades and Palm Beach, Florida.

This report details the results of sidescan sonar survey of the candidate sites for Ocean Dredged Material Disposal Sites (ODMDSs) offshore Port Everglades and Palm Beach, Florida conducted in 1998. The survey was conducted by EPA Region 4 personnel aboard the OSV Peter W. Anderson from August 18, 1998 to August 23, 1998.

2.0 METHODS

Sidescan sonar data was collected along north/south transects for each survey area utilizing a Klein™ 595 system. Only 100kHz frequency data was collected. Cable length (3,000ft) prohibited the collection of the 500 kHz frequency. Transects completed are shown in Appendix A. Transect spacing was set at 250 meters for the primary survey areas and at greater distances for the secondary areas. The system range was set at 250 meters to provide 100 percent overlap in the primary survey areas. Operating parameters for each survey area is given in Table 1.

Table 1: Survey Operating Parameters

Survey Area	Transect Spacing (m)	Range (m)	% Overlap	Speed (knots)
PE-A, PB-A	250	250	100	3
PB-B, PE-B	300	250	67	3
PE-C, PE-D, PB-C, PB-D	750-1000	250	0	3

Operating parameters are selected based on guidance provided in "Side Scan Sonar Record Interpretation" (Klein Associates) and "Sound Underwater Images, A Guide to the Generation and Interpretation of Side Scan Sonar Data" (Fish, 1990) and desired resolution of 1 meter for the primary survey areas and 2 meters for the secondary survey areas. Shorter transect spacing was selected for the survey areas encompassing the preferred candidate sites to provide greater resolution. Larger transect spacing was selected for the candidate sites less likely to be selected. Even a larger transect spacing was selected for the secondary survey areas since these areas are outside the expected zone of impact from disposal. Grab sampling from a previous survey was used to ground-truthing the general characteristics of the bottom. Benthic photography was unsuccessfully attempted.

Data was recorded both in analog format on thermal paper and digitally on optical disks utilizing the EOSCAN™ software onboard the OSV Anderson. Frequent system crashes caused data gaps in the digital data. However, full coverage was recorded on the thermal paper.

3.0 RESULTS AND DISCUSSION

3.1 Port Everglades 4 Mile Candidate Site

The sidescan mosaic of the survey area (Figure 1) shows a composite of the survey lanes. Gaps in the data are due to technical difficulties in recording the sidescan data electronically (see Section 2.0). Results show a relatively uniform sandy bottom of medium reflectance with an east/west running low relief ridge through the middle of the candidate site and an east/west running low relief ridge to the northwest of the candidate site. Grab samples taken earlier from the survey area showed a grey, slightly to very silty fine sand with shell fragments. The mean grain sizes was approximately 0.18mm with 16% silts and clays (EPA, 1999). The low relief areas are identified by a generally darker acoustic signal with little to no shadows. The low relief areas are shown in Figure 2 and their acoustic images are shown in Appendix B.

Numerous scattered acoustic targets of varying size were detected throughout the survey area. These were identified by dark acoustical signals with shadows. Most of these were located outside of the candidate site boundaries. The location of these targets are shown in Figure 3. They are divided into large and small targets. The acoustic images for most of these targets are

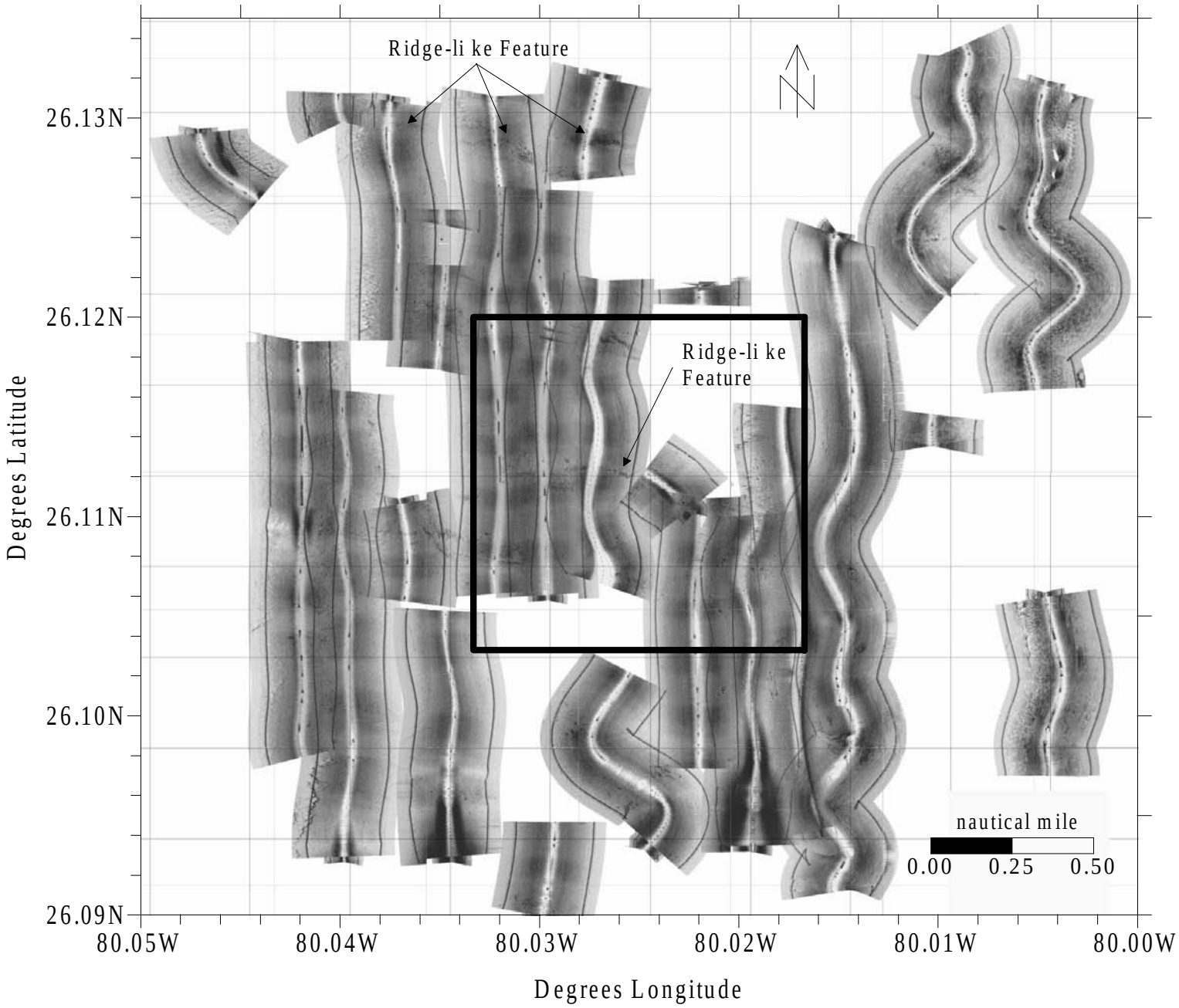

Figure 1: Sidescan Mosaic for the Port Everglades 4 Mile Site

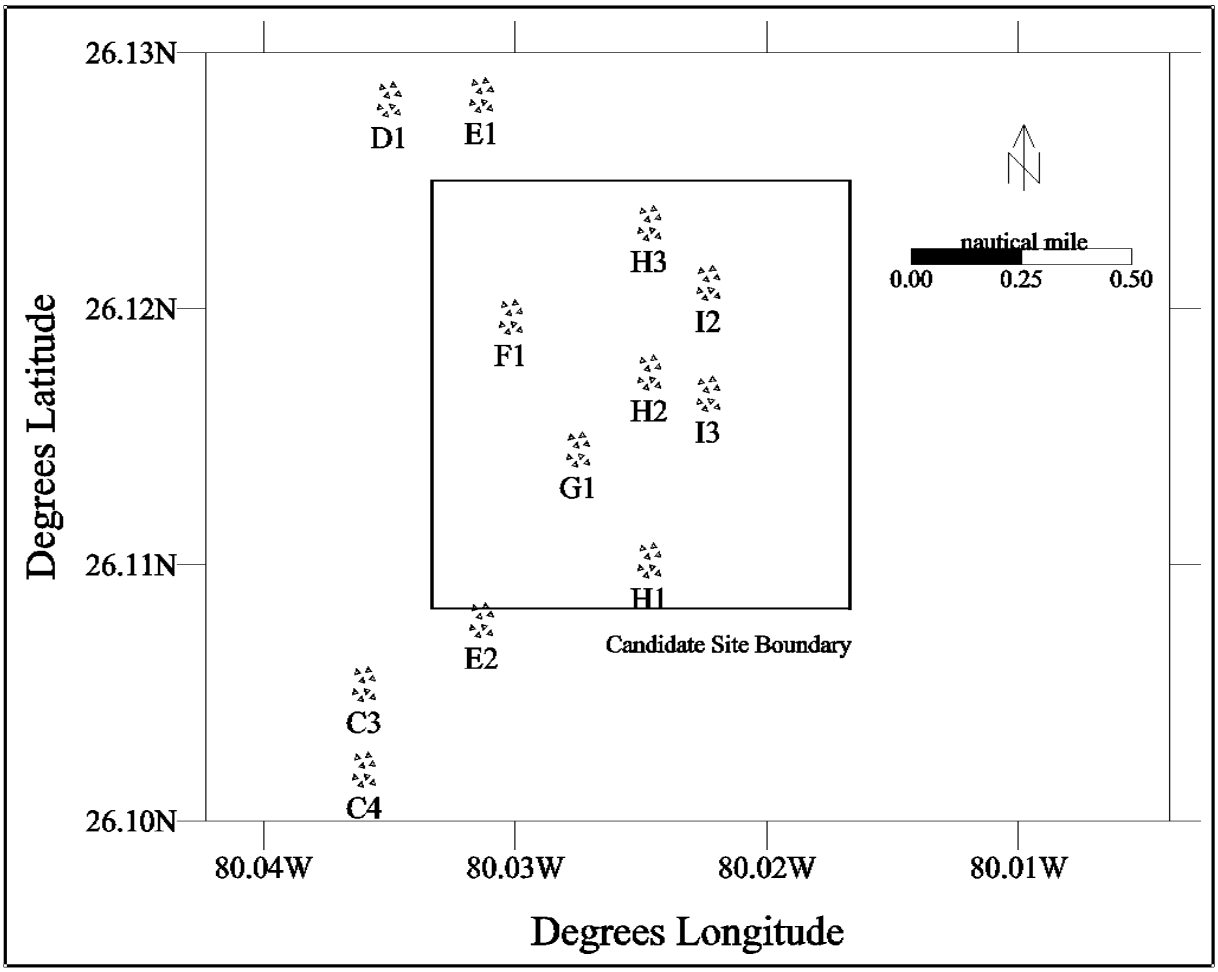

Figure 2: Areas of Scattered Low Relief In and Near the Port Everglades 4 Mile Candidate Site. Labels correspond to acoustic images presented in Appendix B.

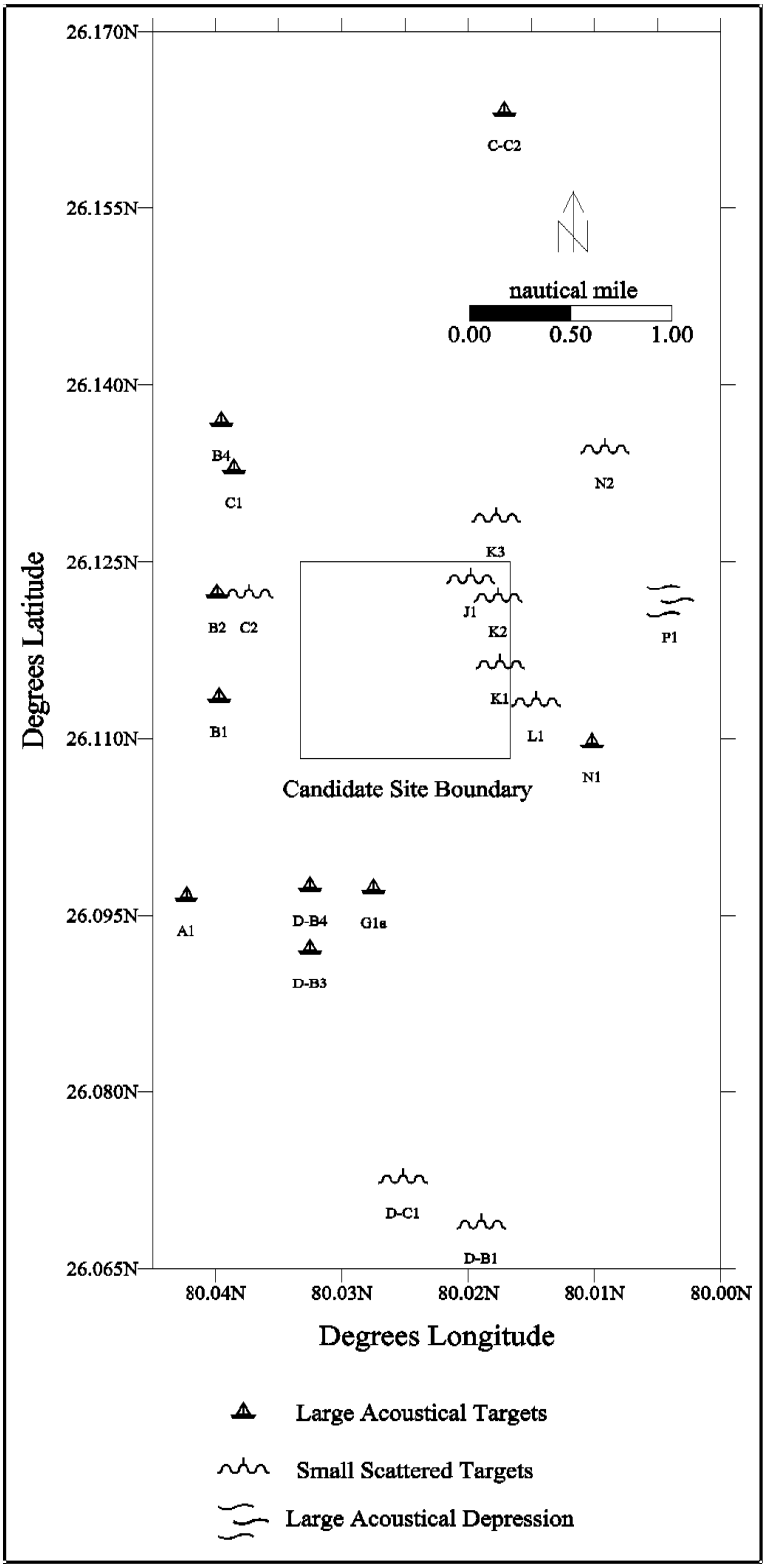

Figure 3: Acoustical Targets In and Near the Port Everglades 4 Mile Candidate Site. Labels correspond to acoustic images presented in Appendix B.

shown in Appendix B. One of these acoustic targets (P1) consists of three large depressions surrounded by large sand waves. The depressions are approximately 25 meters across and refraction of the acoustical signal was observed in the vicinity. Refraction is indicative of density changes in the water column (Fish, 1990). These depressions resemble impact craters or possibly freshwater vents.

Five of the acoustical targets were identified as possible wrecks based on the shape of their reflective return and shadow. The position of these targets are shown in Figure 4. The acoustical images for these targets are shown in Appendix B. All of these targets are outside of the candidate site boundaries and three are within the Navy South Florida Testing Facility Testing Range.

3.2 Port Everglades 7 Mile Candidate Site

A quality sidescan mosaic of the survey area is not available due to poor DGPS navigation data and the frequent system crashes described in Section 2.0. A mosaic of the available digital data is presented in Appendix C. The southern portion of the survey area (south of 26° 8" latitude) consisted of a relatively uniform low relief hard bottom. Attempts at benthic sampling of the area earlier in the survey resulted encountered hard bottom. Some rocks were retrieved that consisted of fossiliferous limestone, slightly dolomitic with magnesite dendrites. They were identified as being from the Floridian Aquifer of the Suwanee Formation (EPA, 1999). The northern portion of the survey area showed a relatively uniform sandy bottom. Grab samples taken from this area showed a grey, slightly silty, fine sand with shell fragments. The mean grain size was approximately 0.22mm with 10 to 18 percent silts and clays (EPA, 1999). Figure 5 shows the transition zone from the hard bottom area to the sandy bottom area. Examples of the low relief hard bottom areas and the uniform sandy bottom areas can be found in Appendix C.

Only a few scattered targets were detected throughout the survey area. These were identified by dark acoustical signals with shadows. The locations of the targets are shown in Figure 6. The acoustic images for most of these targets are shown in Appendix C.

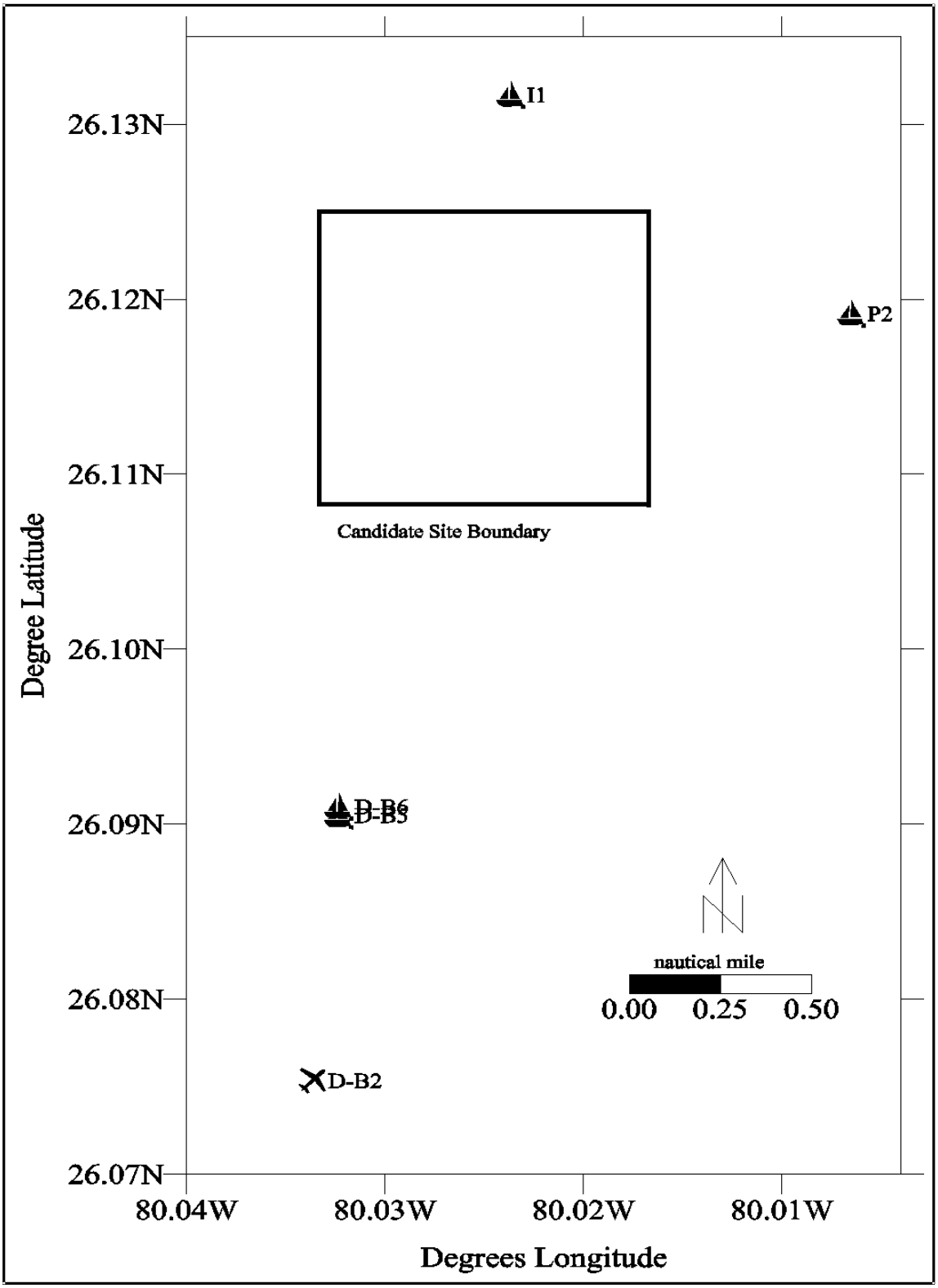

Figure 4: Potential Wrecks Near the Port Everglades 4 Mile Candidate Site. Labels correspond to acoustic images presented in Appendix B.

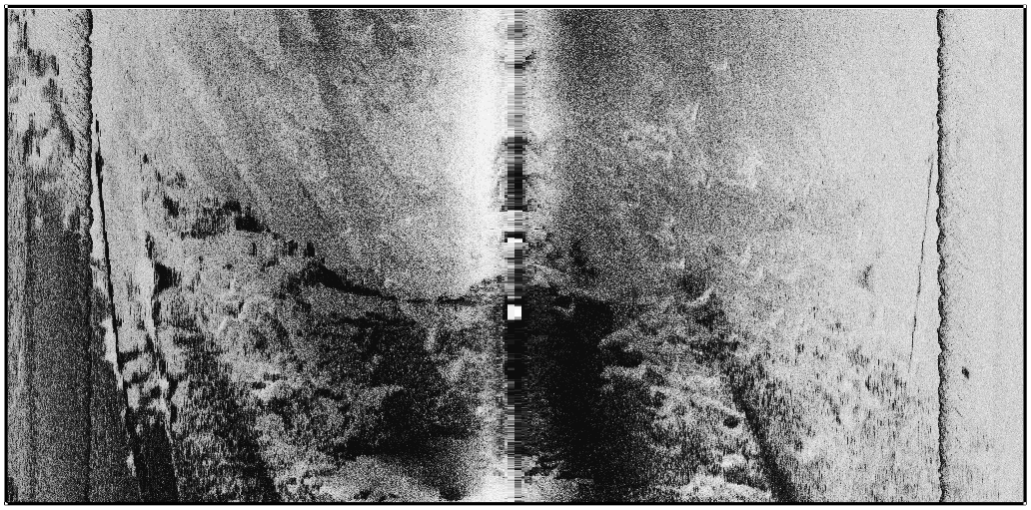

Figure 5: Port Everglades 7 Mile Candidate Site Hard Bottom to Soft Bottom Transition Zone Sidescan Sonar Image.

3.3 Palm Beach Interim, 3, and 4.5 Mile Candidate Sites

The sidescan mosaic of the Palm Beach Interim, 3 and 4.5 Mile Candidate Sites (Figure 7) shows a composite of the survey lanes. Gaps in the data are due to technical difficulties in recording the sidescan data electronically (see Section 2.0). A mosaic including the survey lanes to the north and south of the 4.5 Mile Candidate Site is in Appendix D. Results show a relatively uniform sandy bottom of medium reflectance throughout most of the site with areas indicative of rubble or cobbles within the Interim Site and along the western boundary of the 3 Mile Candidate Site. Only a few scattered targets were detected throughout the survey area. These were identified by dark acoustical signals. The locations of the targets are shown in Figure 8. The acoustic images for most of these targets are shown in Appendix D. The most notable target (A1) is found in the northwest corner of the survey area. It consists of acoustical returns representative of scattered patches of low relief hard bottom. These patches range in size up to 100 meters in length.

Interim Candidate Site

Interpretation of the side-scan sonar data indicated that sediments within the site ranged from fine to coarse-grained sand. Circular areas of coarser material were scattered throughout the site. These are possibly indicative of previous disposal activity at the site. The Interim Site has been used for disposal of greater than five million cubic yards of dredged material in the past. The disposed dredged material has been characterized as poorly graded sand (median grain size of 0.43 mm) with traces of shell fragments (BVA, 1985). Grab samples taken in 1985 showed the substrata to consist of silty sand, sand and sand/coralline rubble. Median grain size ranged from 0.17 to 0.30 mm (BVA, 1985).

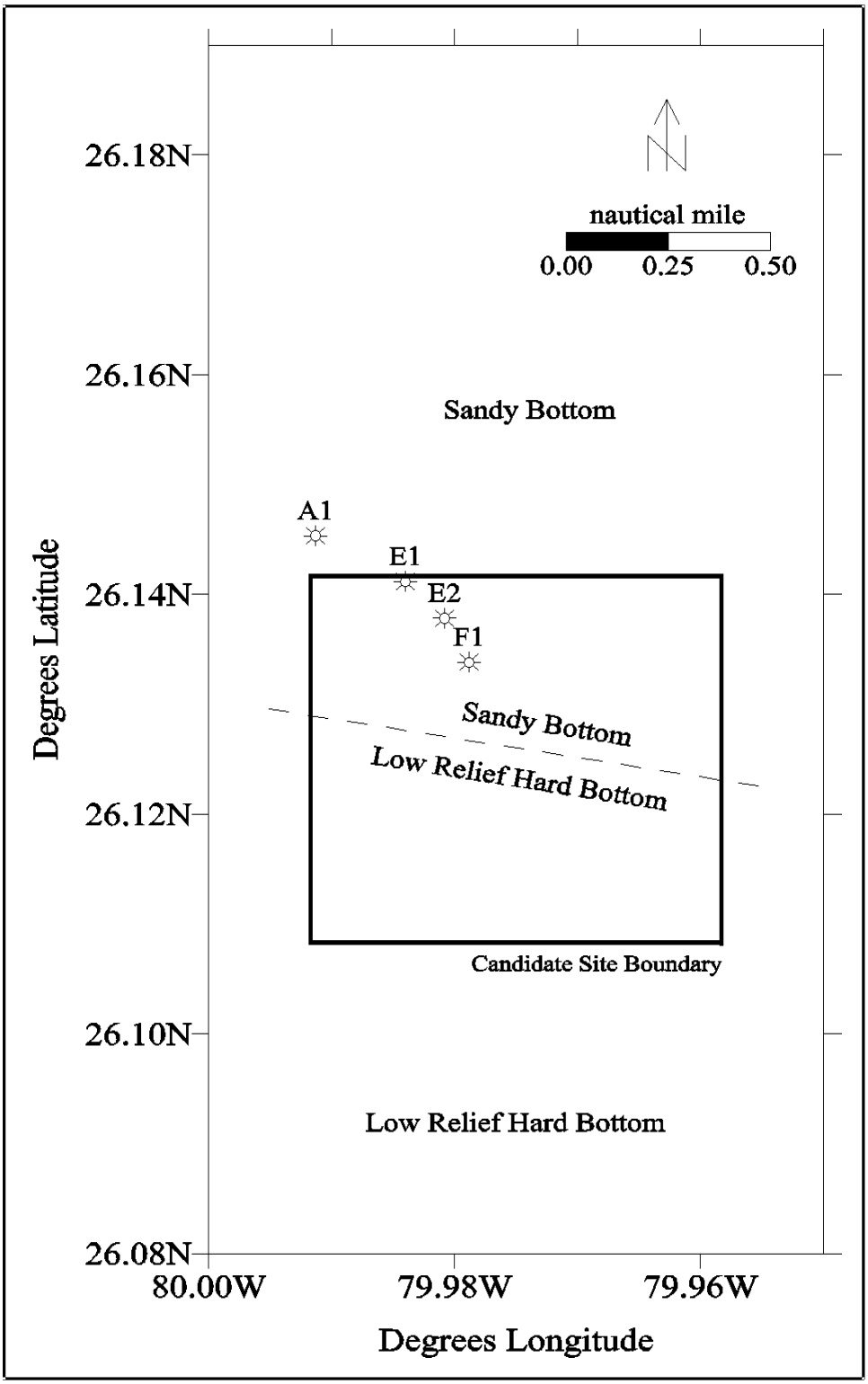

Figure 6: Bottom Type and Acoustical Targets In and Near the Port Everglades 7 Mile Candidate Site. Labels correspond to acoustic images presented in Appendix C.

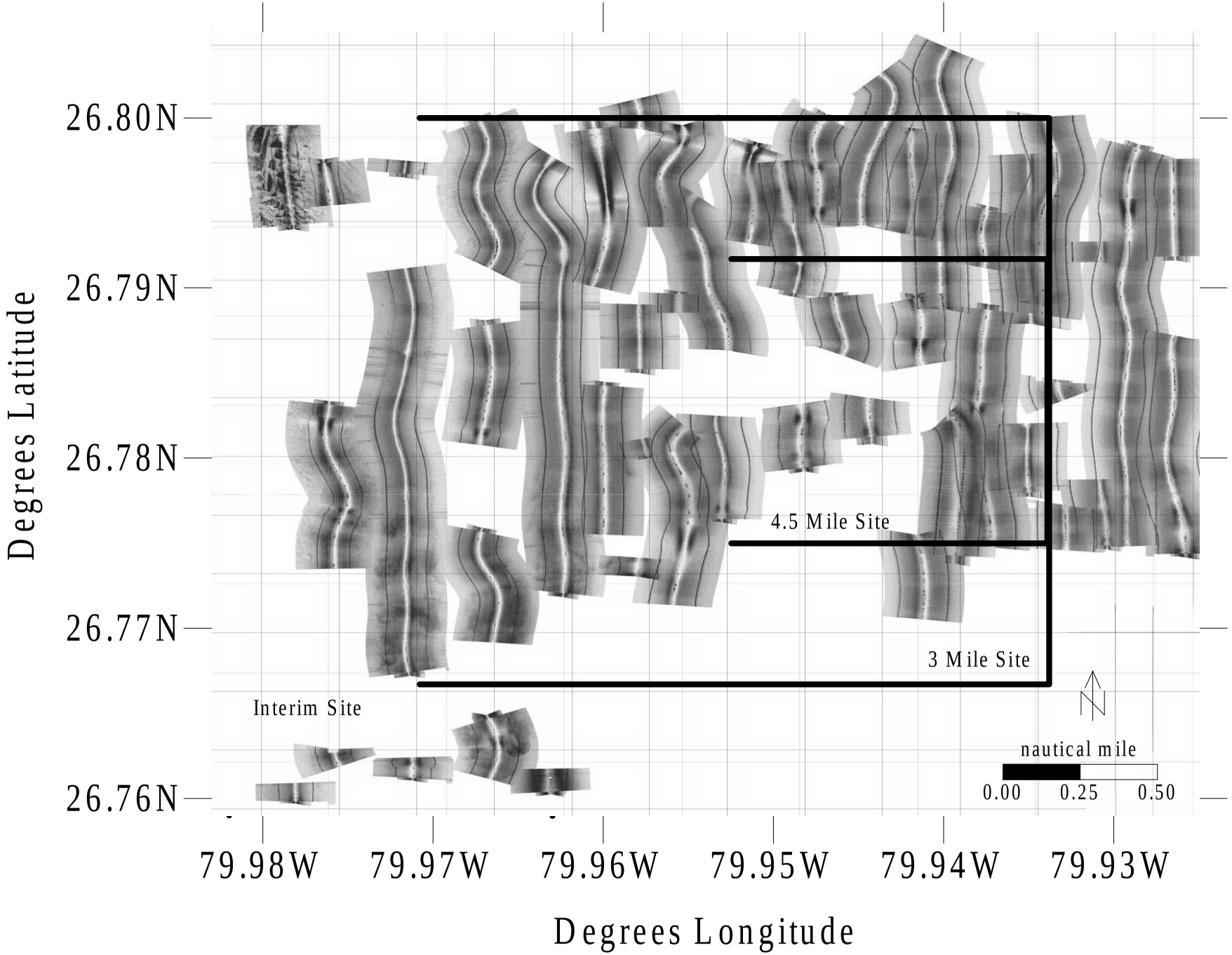

Figure 7: Sidescan Mosaic for the Palm Beach Interim, 3 Mile and 4.5 Mile Candidate Sites.

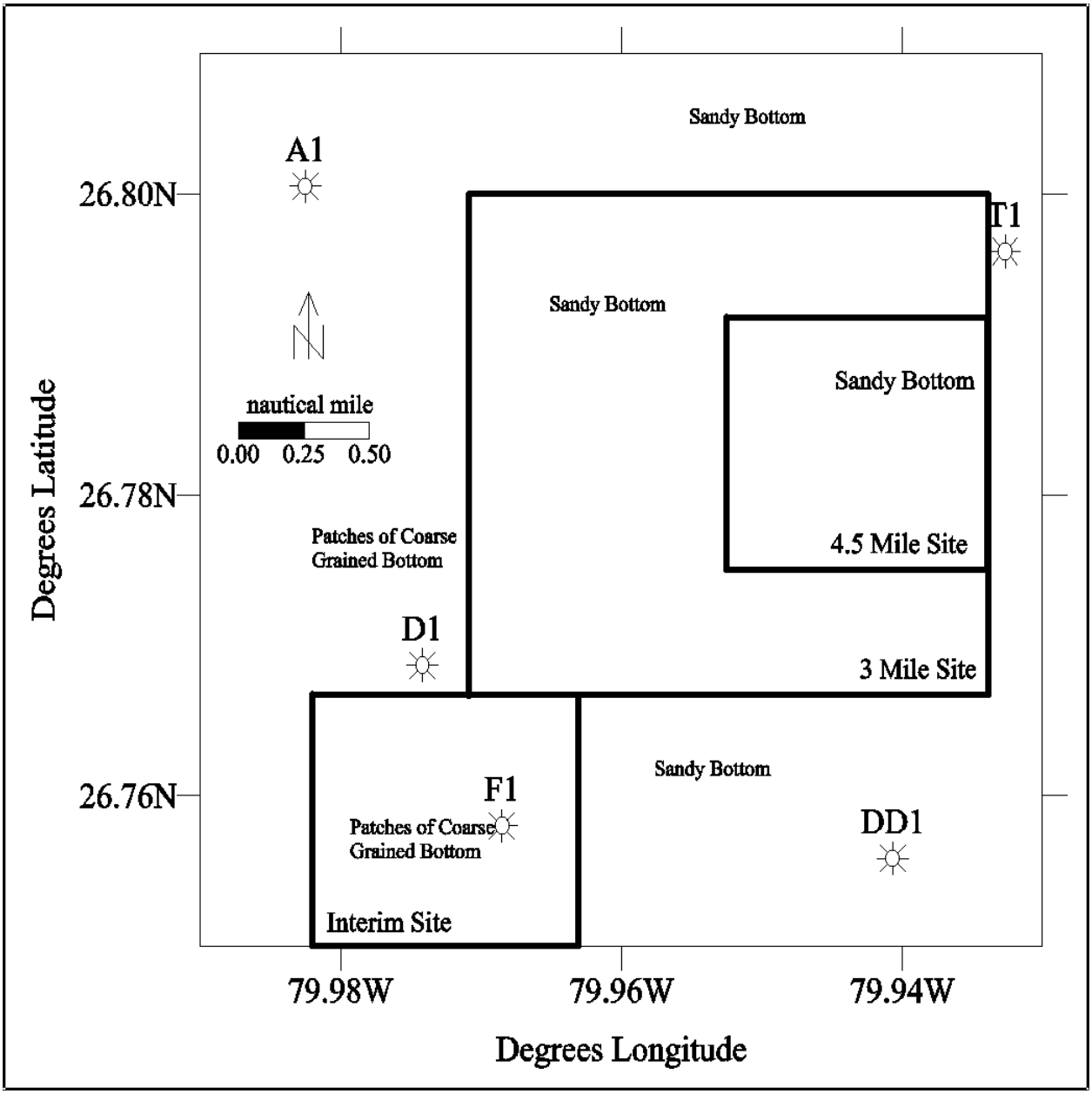

Figure 8: Sidescan Targets and Bottom Type for the Palm Beach Interim, 3 Mile and 4.5 Mile Candidate Sites. Labels correspond to acoustic images presented in Appendix D.

3 Mile Candidate Site

The side-scan sonar data indicated a relatively uniform fine sandy bottom throughout the site. Areas of coarser material were indicated just outside the western boundary of the site. Grab samples taken in 1988 showed a predominately medium-to-very fine sand sediment texture in the site (CSA, 1989). No areas of hard bottom or potential wrecks were identified through the side-scan record within the site.

4.5 Mile Candidate Site

The side-scan sonar data indicated a relatively uniform fine sandy bottom throughout the site and areas 2 miles to the north and 2 miles south of the site (Figure 7 and Appendix D). Grab samples taken earlier in the year showed sediments in the 4.5 Mile Candidate site to consist of a grey silty fine sand with shell fragments. The mean grain sizes for the area ranged from 0.14 to 0.17mm with 25 to 35 percent silts and clays (EPA, 1999). No areas of hard bottom or potential wrecks were identified through the side-scan record within the site or north or south of the site.

3.4 Palm Beach 9 Mile Candidate Site

A quality sidescan mosaic of the survey area is not available due to poor DGPS navigation data and the frequent system crashes described in Section 2.0. A mosaic of the available digital data is presented in Appendix E. The side-scan sonar data indicated a relatively uniform fine sandy bottom throughout the site. Grab samples taken from this area showed a grey-green silty fine sand with some shell fragments. The mean grain size was approximately 0.21mm with 18 to 23 percent silts and clays (EPA, 1999).

Only a few scattered targets were detected throughout the survey area, none signifying any significant resources. These were identified by dark acoustical signals. The locations of the targets are shown in Figure 9. The acoustic images for these targets are shown in Appendix E.

4.0 SUMMARY

The objective of this survey was to characterize the substrate types and geologic features of candidate ocean dredged material disposal sites offshore Port Everglades and Palm Beach, Florida and to identify any potential significant resources within their vicinity. A total of 6 sites were examined. Most of the area surveyed consisted of sandy bottom. However, a significant portion of the Port Everglades 7 Mile Candidate Site consisted of low relief limestone hard bottom and the Port Everglades 4 Mile Candidate Site and surroundings contained numerous unidentified highly reflective objects.

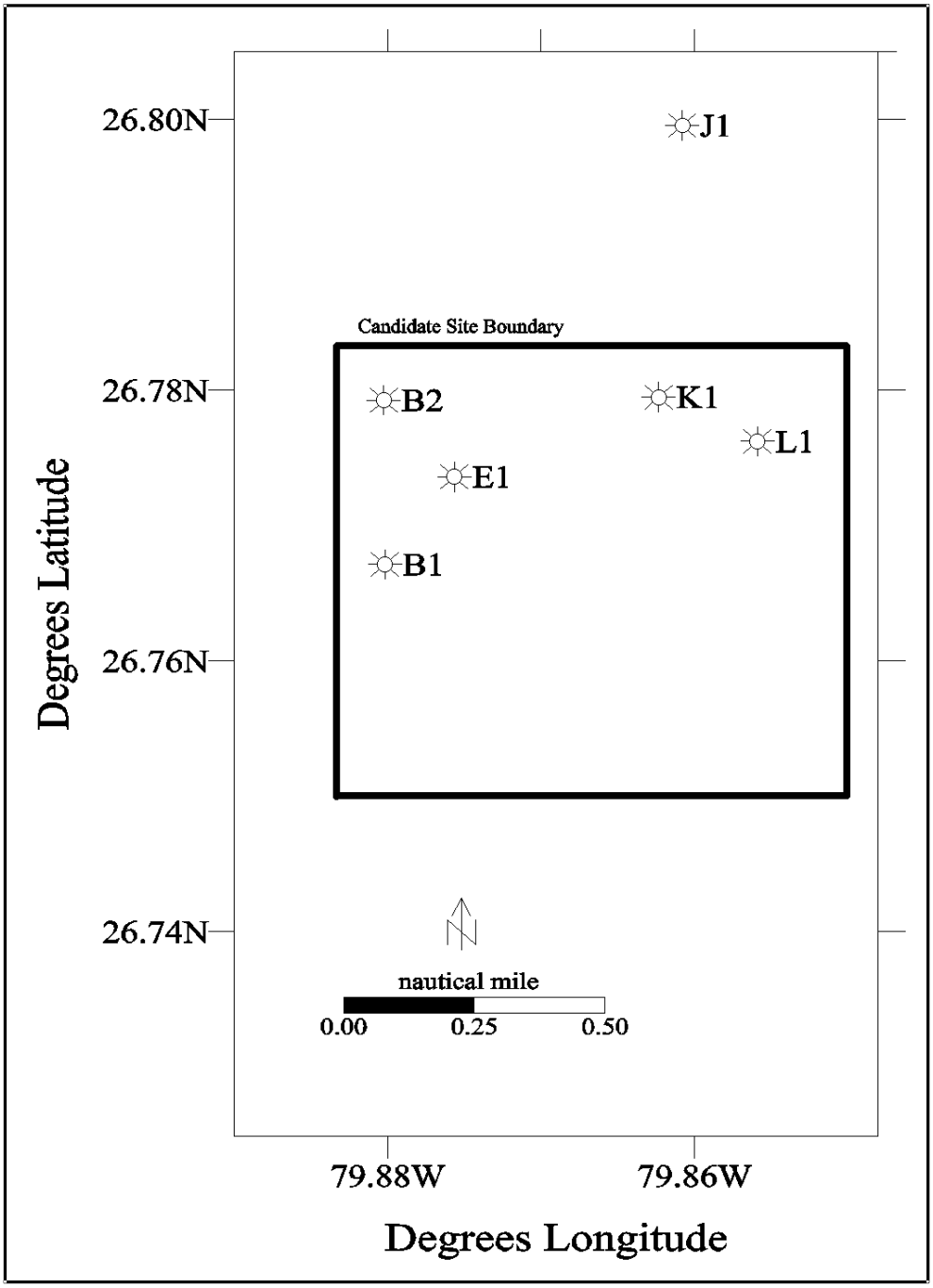

Figure 9: Sidescan Targets for the Palm Beach 9 Mile Candidate Site Labels correspond to acoustic images presented in Appendix E.

6.0 REFERENCES

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APPENDIX A

SIDESCAN SONAR TRANSECTS